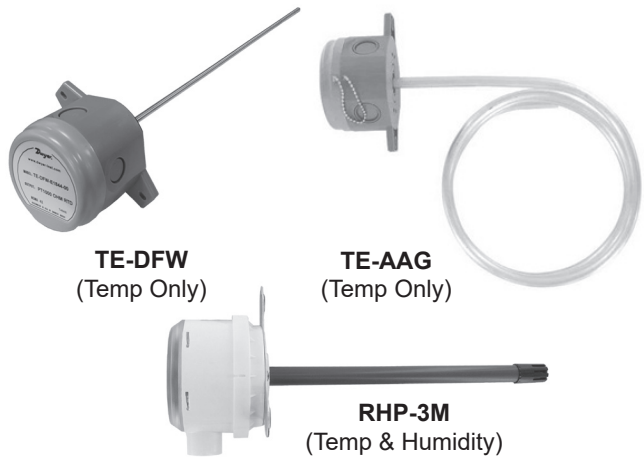
August, 2021

INSTALLATION INSTRUCTIONS
Dwyer Fixed Length & Averaging Duct Temp/Humidity Sensors model series "D", "H", "I", "O", and "MPR"

Fixed Length and Averaging Sensors



⚠ WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All units must be wired strictly in accordance with wiring diagram furnished with the unit. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. All wiring must be done with a wiring material having a temperature rating of at least 105°C.

⚠ CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

IMPORTANT

1. The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these kits must be performed by a qualified installation and service agency.
2. These instructions must also be used in conjunction with the Installation and Service Manual originally shipped with the unit, in addition to any other accompanying component supplier literature.

Application

The Dwyer temperature and temperature/humidity sensors are used in conjunction with the Carel controller used on:

- Model series "D", "H", "I", and "O" Indirect Fired Make-Up Air Units that feature the Modine Control System option (model Digit 12=9)
- All model "MPR" Packaged Ventilation/Dedicated Outside Air System (DOAS) Units.

The sensors are used in different locations depending on the unit model and application/function. They may be used as supply air sensors, return air sensors, and/or outside air sensors. The sensors are to be field installed in the supply, return, or outside air ductwork.

The sensors ship loose with a packing slip identifying the part numbers. The part numbers and application of the sensors can be seen in the following tables:

Supply Air Sensors

Unit Model Series	Item Code	Dwyer Part Number	Sensor Length	Sensor Type
"D", "H", "I", & "O"	31010	TE-DFW-E18x4-00	18" Fixed	Temp Only
MPR	66798	TE-DFW-E18x4-00	18" Fixed	
	66799	TE-AAG-E0634-00	6' Averaging	
	66800	TE-AAG-E1234-00	12' Averaging	

Return Air Sensors

Unit Model Series	Item Code	Dwyer Part Number	Sensor Length	Sensor Type
"D", "H", "I", & "O" ①	31011	TE-DFW-E18x4-00	18" Fixed	Temp Only
	31012	RHP-3M1E	9" Fixed	Temp/Humidity

① Return air sensors, if required on MPR units, are factory installed.

Outside Air Sensors

Unit Model Series	Item Code	Dwyer Part Number	Sensor Length	Sensor Type
"D", "H", "I", & "O" ②	31007	TE-DFW-E18x4-00	18" Fixed	Temp Only
	31006	RHP-3M1E	9" Fixed	Temp/Humidity

② Outside air sensors, if required on model MPR units, are factory installed on units with Model Digit 7=D, E, or F. For Model Digit 7=A, B, C, or R, refer to the latest revision of literature #74-540 for remote mounted outside air sensors.

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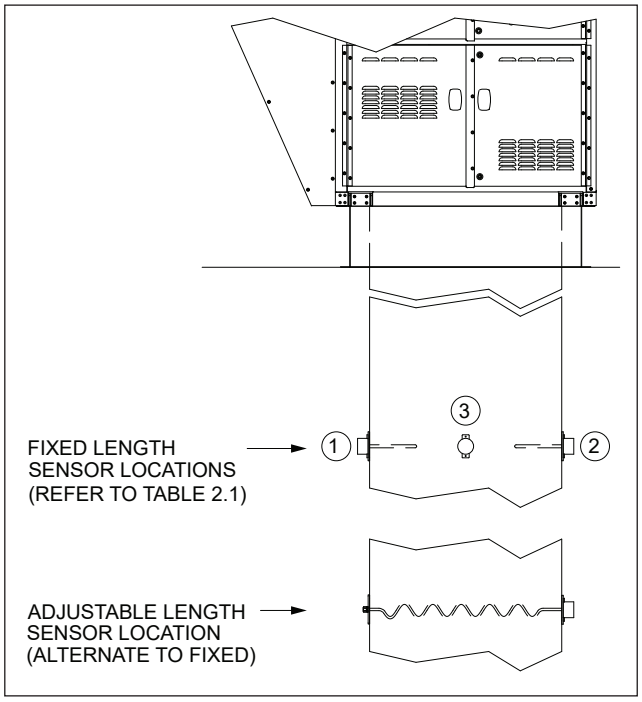
Sensor Installation Location

Shipped loose sensors must be field installed in the supply, return, and/or outside (inlet) ductwork, depending on the unit and application/function of the sensor shipped with the unit. Refer to the packaging and the Application section on the previous page.

Location of sensors are very important for proper control. Consider the following for proper location (see Figure 2.1):

- Where possible, the sensor should be located as follows:
  - » **Supply Air Sensor:** In the supply air ductwork, between 8 and 20 feet downstream from the unit discharge connection.
  - » **Return Air Sensor:** In the return air ductwork, within 10 feet of the unit return air connection.
  - » **Outside Air Sensor:** In the outside (inlet) air ductwork, within 10 feet of the unit outside air connection.
- The sensor should be mounted in a single perimeter duct as shown in Figure 2.1. If the ductwork is split, the sensor should be mounted before the split is made. Locating sensors in a branch duct as shown in Figure 2.2 may cause poor temperature control.
- Avoid placing the sensor near turns in the ductwork.

Figure 2.1 – Duct Sensor Installation Locations ①

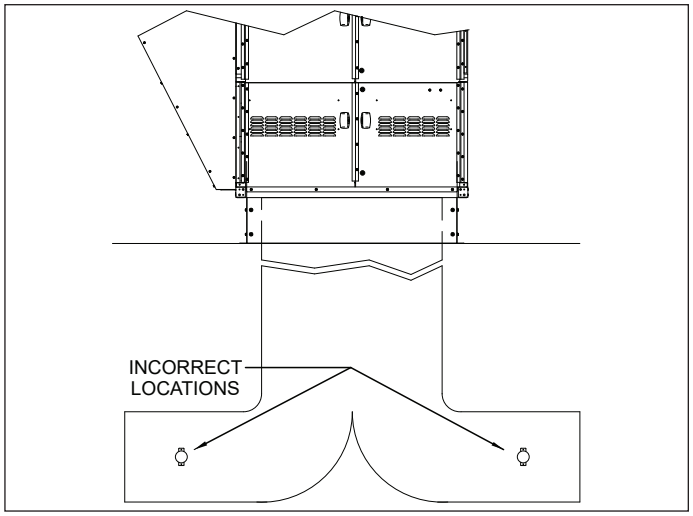


① Supply duct shown for reference.

Table 2.1 – Preferred Mounting Locations for Fixed Length Supply Air Sensor

Unit Model Series	Preferred Location
"D", "H", "I", & "O"	1, 2, or 3
MPR B-Cabinet	
MPR C-Cabinet	1 or 2
MPR D-Cabinet	

Figure 2.2 - Incorrect Split Duct Sensor Locations



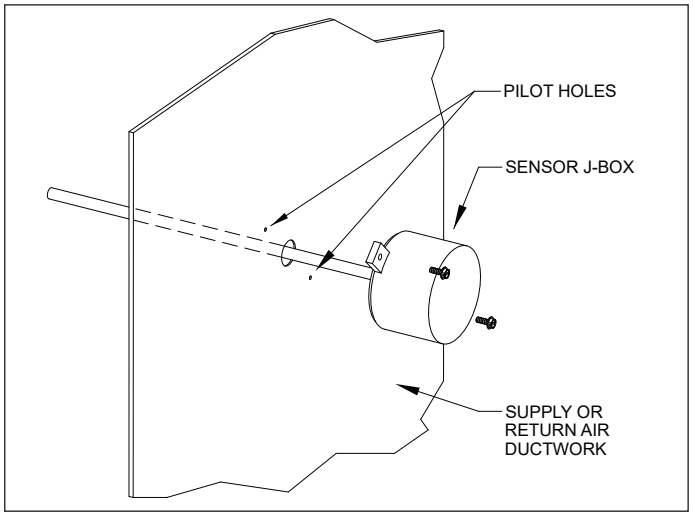
- For the Fixed Length Probe Sensor, the supply air sensor should be mounted following Figure 2.1 and Table 2.1. Return and/or outdoor air sensors are not as critical as to which side of the duct they are mounted.
- For the Adjustable Length Averaging Sensor (supply air sensor only), the sensor should be mounted so it spans the width of the duct, from side to side of the duct.

Sensor Installation - Fixed Length Probes

Once the location of installation on the ductwork is determined from the previous section, install the sensor as follows:

1. Verify the sensor being installed is the correct sensor for the duct on which it is being installed.
2. For the temperature only sensor, drill a ½" hole in the duct for the probe to be inserted. For the temperature/humidity sensor, drill a 1" hole.
3. Slide the sensor through the hole in the duct and mark where pilot holes are required to secure the sensor mounting tabs to the duct. Remove the sensor and drill 1/8" pilot holes.
4. Verify the gasket that came with the sensor is secured on the back of the sensor junction box. Slide the sensor back into place and secure with the screws included.

Figure 2.3 - Drill Locations for Sensor Mounting

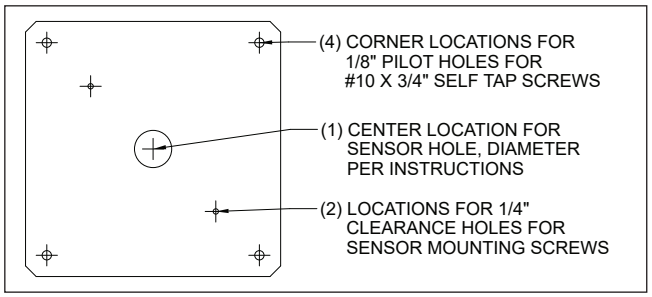


Sensor Installation - Adjustable Length

Once the location of installation on the supply air ductwork is determined from the “Sensor Installation Location” section, install the sensor as follows:

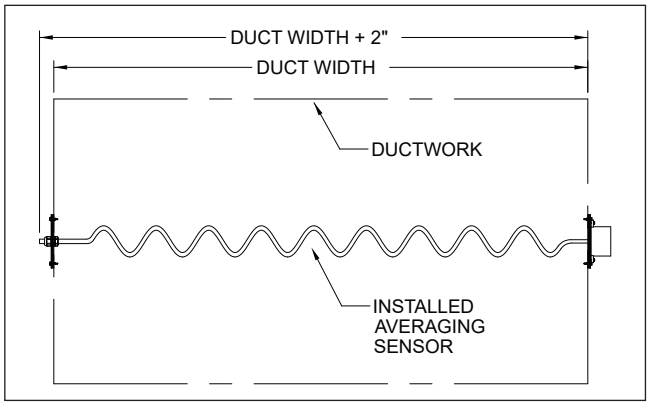
1. For all adjustable length averaging sensors, use the Sensor Mounting Plate included with the kit (see Figure 3.1) as a template to mark where to drill the required holes in the mounting location of the duct. Do not drill through the Sensor Mounting Plate, only use it for marking the ductwork. For the sensor hole in the center location, drill a hole between 1” and 4” in diameter. The end of the sensor needs to be mounted on the opposite side of the duct, so a larger hole will help with maneuvering the sensor during installation.

Figure 3.1 - Sensor Mounting Plate Drill Locations



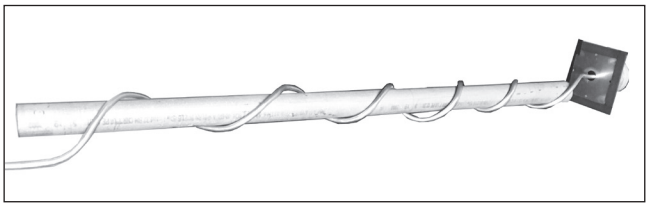
2. In the same location on the opposite side of the duct (directly across from where the holes were drilled in Step 1), repeat Step 1 for the (4) corner holes and the center location sensor hole. The (2) ¼” clearance holes are not required. The center sensor hole should be between 1” and 4” in diameter as noted in Step 1.
3. The sensor length may need to be adjusted before installation in the duct. Measure the outside width dimension of the duct, across where the sensor will be installed, as shown in Figure 3.2.

Figure 3.2 - Adjustable Length Sensor Dimension



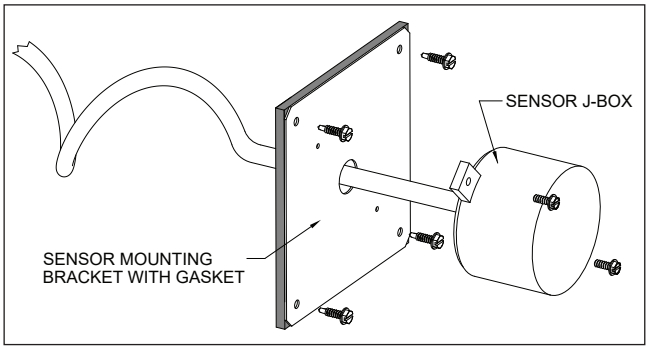
4. The sensor should be approximately 2” longer than the outside dimension of the duct, as shown in Figure 3.2. To adjust the sensor length, follow these steps:
   a. The aluminum sensor element tube is coiled when it ships. Straighten the sensor and measure the length.
   b. If the sensor needs to be shortened, the best way is to coil the tubing around a pipe, such as a 1-1/2” PVC pipe as shown in Figure 3.3. Like a spring, the coiled sensor tubing can be stretched or compressed to get the desired length.

Figure 3.3 - Adjusting Length of Sensor Tubing



4. Verify the gasket that came with the sensor is secured on the back of the sensor junction box. Slide the sensor through the center hole on the Sensor Mounting Plate and secure with (2) #10 x ½” hex head screws included with the kit assembly as shown in Figure 3.4. Be sure that the gasket on the Sensor Mounting Plate is on the opposite side from the sensor junction box.

Figure 3.4
Sensor to Sensor Mounting Bracket Installation



5. Slide the sensor element into the center hole drilled in the duct. Do not secure yet.
6. Carefully maneuver the sensor assembly to extend the end of the sensor through the hole on the opposite side of the duct. This may be easier with a second person located on the opposite side of the duct. Once the end of the sensor is through the hole in the duct, secure the Sensor Mounting Plate on the sensor junction box side to the duct with the (4) #10 x ¾” self-tapping screws included with the kit.

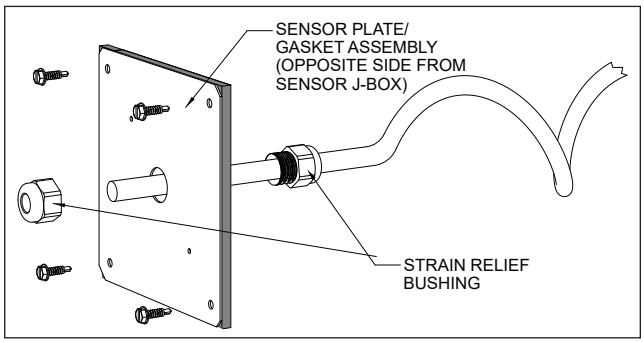
(continued next page)

Dwyer Fixed/Adjustable Length Duct Sensor Installation

(continued from previous page)

7. On the opposite side, slide the main body of the strain relief bushing over the sensor tubing as shown in Figure 4.1.
8. Slide the Sensor Mounting Plate over the end of the sensor tube and slide the bushing through the center hole of the Sensor Mounting Plate. Loosely thread on the strain relief bushing nut but do not tighten. Slide the Sensor Mounting Plate so that it is securely against the duct. If it does not slide, the bushing nut is likely threaded on too tightly.
   a. Once the Sensor Mounting Plate is securely against the duct, secure the plate using the (4) #10 x ¾" self-tapping screws included with the kit.
   b. Hand tighten the strain relief bushing nut.

Figure 4.1 - Adjustable Sensor End Support

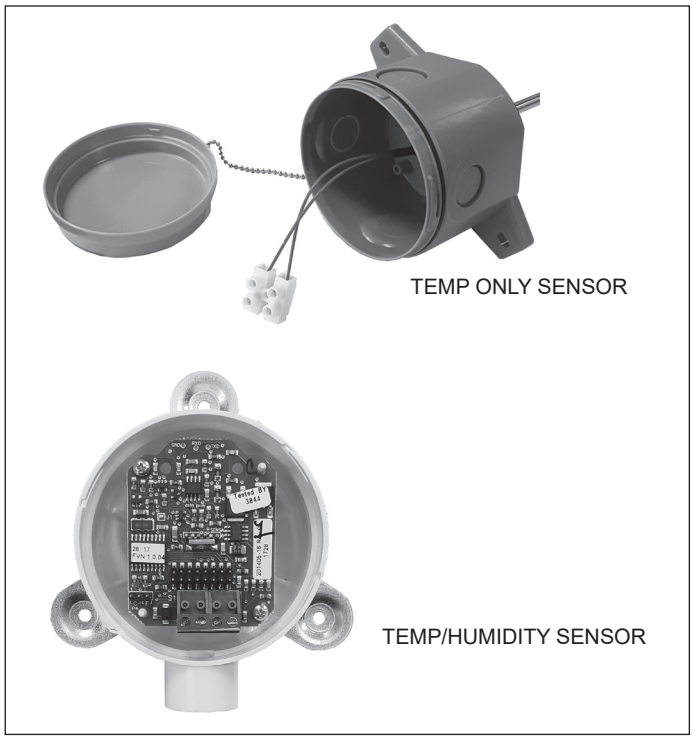


Wiring to the Main Unit Carel Controller

For wiring of the sensor, please refer to Figure 4.2 and the following instructions:

1. Remove the cover of the sensor junction box by rotating the cover counterclockwise.
2. For the temperature only sensors, remove the bottom knockout on the junction box. The temperature/humidity sensor has a threaded connection on the bottom of the junction box. Install the wiring strain relief bushing included in the kit.
3. For the temperature only sensors, connect the two red wires from the sensor to the terminal blocks included in the junction box. Temperature/humidity sensors have a terminal block already installed.
4. Route the control wire (minimum 24AWG twisted pair shielded cable) between the sensor and the controller through the bushing and wire to the terminal block in the junction box per the wiring diagram on the unit.
5. Reinstall the cover of the sensor junction box by rotating it clockwise.
6. Wire the control wiring to the main unit controller per the wiring diagram on the unit.

Figure 4.2 - Sensor Junction Box Wiring



Duct Sensor Resistance Values

The Dwyer fixed and adjustable length sensors all include temperature sensing. See Table 4.1 for the resistance values at various temperatures. For temperature/humidity sensors, the humidity output is a separate signal.

Table 4.1 - Sensor Resistance vs. Temperature

°F	Ω	°F	Ω	°F	Ω
0	930.3	42	1021.7	84	1112.4
2	934.7	44	1026.0	86	1116.7
4	939.0	46	1030.4	88	1121.0
6	943.4	48	1034.7	90	1125.3
8	947.8	50	1039.0	92	1129.6
10	952.1	52	1043.3	94	1133.9
12	956.5	54	1047.7	96	1138.2
14	960.8	56	1052.0	98	1142.5
16	965.2	58	1056.3	100	1146.8
18	969.5	60	1060.6	102	1151.1
20	973.9	62	1065.0	104	1155.4
22	978.3	64	1069.3	106	1159.7
24	982.6	66	1073.6	108	1164.0
26	986.9	68	1077.9	110	1168.3
28	991.3	70	1082.2	112	1172.6
30	995.6	72	1086.6	114	1176.8
32	1000.0	74	1090.9	116	1181.1
34	1004.3	76	1095.2	118	1185.4
36	1008.7	78	1099.5	120	1189.7
38	1013.0	80	1103.8	122	1194.0
40	1017.3	82	1108.1	124	1198.2

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